DOCUMENT RESUME

ED 257 432 IR 011 619

AUTHOR Adams, Dennis M.
TITLE Using Computer-Based Artificial Intelligence Technology to Help ESL Students.
PUB DATE 85
NOTE 10p.; Paper presented at the Winter Conference of the Colorado Reading Association.
PUB TYPE Viewpoints (120) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Artificial Intelligence; *Bilingual Instructional Materials; Elementary Secondary Education; *English (Second Language); Language of Instruction; *Limited English Speaking; Position Papers; *Reading Skills; Second Language Instruction

ABSTRACT

This paper discusses ways in which artificial intelligence (AI) technologies may be used to aid students for whom English is a second language in the development of language and reading skills, and asserts that the coupling of technology with close adult-teacher contacts within a context of cultural precedents and social rewards is an important element in success. Three major categories of problems that may inhibit the learning of reading and language skills are identified: physical (both aural and visual), environmental experience, and inadequate teaching. To illustrate how AI may help build a sound language base, the paper cites two examples of microcomputer knowledge-based systems: the Reading Computer that reads to children in several languages, thereby helping unilingual English teachers provide necessary background in a child's first language; and experimental systems that can instantly translate a teacher's English language voice into another language (Spanish, French, German, or Russian). It is suggested that AI language programs can help develop higher order thinking skills and systematic problem solving strategies, and should be incorporated into educational programs for minority students as early in their education as possible. (THC)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
This document has been reproduced as received from the person or organization originating it.
Minor changes have been made to improve reproduction quality.
Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

Using Computer-Based Artificial Intelligence Technology to Help ESL Students

Paper Given at the Winter (1985) Conference
of the Colorado Reading Association
Dr. Dennis M. Adams
Associate Professor
University of Northern Colorado

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Dennis M. Adams
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

ED257432

Minority students have often looked on education a little like a rainy day: boring, a big problem, uncontrollable, to be adjusted to, and impossible to get through dry. A recent national study sees Hispanic students being "wasted" by the schools. (1) Nearly 40% of Hispanic students drop out before they start high school. And less than half complete the normal high school program. Projected to be the count. 's largest minority by 1990, we are failing these students in greater numbers than any other group.

Not developing a social sensitivity in ENL students compounds the failure. As ESL children are pushed out of the educational mainstream, students who have English as their native language are losing the opportunity for being exposed to the significance of cultural similarities and differences. And it is through such multiple cultural encounters that children gain an understanding of the nature of our pluralistic society -- as well as insight into their own values, customs and identities.

Why are we losing such a large percentage of ESL students and what can be done to reverse this trend. Many of these children lack a sound base in language and reading skills which prevents them from achieving their goals. In addition, numerous Hispanic students do not

1. National Commission on Secondary Schooling for Hispanics, "Make Something Happen". Washington, D.C., Hispanic Policy Development Project, 1984. Copies of the report are available from the Hispanic Policy Development Project, 1001 Connecticut Avenue, N.W., Washington, D.C.. 20036.

IR011619

BEST COPY AVAILABLE

have close personal contact in school with adults who care about their aspirations and futures. (2)

What seems to be needed is increased opportunity within the school setting to gain a firm base in their native language. Yet there is a contradiction between national programs that call for English to be the dominant language in ESL instruction and research which suggests that students must be familar with their first language to be fully successful in the second. If bilingual programs prove to be politically unacceptable, or if we don't have the resources to get the job done, new developments in artificial intelligence may help us reach some of the same goals. Unilingual English teachers can, for example, use some of the recently developed AI tools to teach Spanish as a "foreign" language -- from preschool on.

Artificial Intellegence Technologies that Bring ESL Students Into the Learning Process

A first step is to provide motivating oral and visual learning activities in both English and Spanish through a kind of spontaneous apprenticeship with others and with machine intelligence. The Kurzweil scanner is an example of an AI device that can read, speak, infer and store in its memory stories in several languages. This machine uses an advanced optical scanner to bring information to a reading/speaking program that was developed by artificial intelligence researchers.(3)

2. This information was provided by the National Commission on Secondary Schooling for Hispanics, "Make Something Happen". Washington, D.C., Hispanic Policy Development Project, 1984.

3. The Reading Computer, developed by Kurzweil Computer Products Inc., Cambridge, MA, (A division of the Xerox Corporation).

BEST COPY AVAILABLE

Crucial to success is the coupling of technology to close adult-teacher contacts within a context of cultural precedents and social rewards. Computer-based AI technology can facilitate both this process and language learning. Specialized AI computer programs are now available that allow teachers to build on the ESL student's learning style and culture. Through collaboration with other learners, teachers and computer-based artificial intelligence students can come into contact with concrete graphic and oral learning experiences.

Reducing Failure

There are three major categories of problems that can stand in the way of learning reading and language skills. The first is physical -- both aural and visual. The second potential problem is environmental experience -- although this should never be used as an excuse to avoid teaching. And the third, is one we don't like to think about -- poor teaching.

Children need to physically be able to interpret the symbols they find on the printed page and make the connection to concrete graphic images. This goes beyond the immediate concept of visual perception to such mental functions as learning a second language, hearing, thinking and feeling. Children who come to school with English as their second language must extract useful meaning from a world that often seems alien and strange. The way these students capture literal and symbolic information has a direct bearing on how they think and act. And of course motivation permeates this whole process.

BEST COPY AVAILABLE

Using Recent Advances In Artificial Intelligence to Build a Sound Language Base

In the early grades it is important for students to gain a firm base in their native language. Reading the printed word requires that children learn to associate spoken words with their corresponding written forms. Rhyming one syllable words gives students a chance to play with letter-sound (grapheme-phoneme) relationships in both languages. Children who have English as their second language should become sensitive to these features of spoken and written languages before they learn to read. Using the new AI technology, like the Reading Computer that reads to children in both languages, can help unilingual English teachers provide this necessary background in a child's first language.

The Reading Computer, built by a subsidary of Xerox, is one of the first practical uses of artificial intelligence -- a type of "expert" or "knowledge-based" system. It can scan texts in the language you choose, make linguistic inferences and reads to a student via a voice synthesizing device. Children see and hear the printed word in the desired language and make the connection to visual images and higher level thinking skills. They see, hear, speak and sometimes arrange the words in a creative context.

Knowledge-based Computer Systems

Knowledge-based systems are computer programs that imitate human thought, compare various facts and sift through their own "history" for similar past situations. Systems, such as the Reading Computer, can reason on the basis of the rule governed knowledge they contain -- there is even space for the rule exceptions. These programs use a

knowledge base and a reasoning component to process symbols rather than numbers. The knowledge base not only contains facts (like a database) but operating rules based on that knowledge. The Reading Computer has "visual" capabilities which enable it to read various languages and recognize almost any typeface. It can make psycholinguistic inferences with a high degree of accuracy. There is a dictionary and a parallel set of rules for pronunciation which allows it to read at a rate of 250 words per minute. Students have control over the reading process and are able to adjust the rate of speech -- as well as the sound of the speaking voice. They can also instruct the computer to go back and reread specified sections. Although the reading computers are specific machines with their own sets of specialized programs. it is possible to access the information they contain with a regular microcomputer (any distance away) either by direct connection or telephone lines.

Other "expert" systems are being worked on that can instantly translate a teacher's English language voice into another language. At the moment the choice is limited to Spanish, French, German and Russian. A grant has recently been given to members of the Foreign Language Department at UCLA to develop a fast computer-based translation pipeline that reads text in one language and transcribes it into another. This would allow for a teacher to place an English textbook on the computer and enable the child to see, hear and interact with the words in both her first and second language.

These, and other, knowledge-based systems are just beginning to come onto the microcomputer market.[4] Some give expert advice on everything from administration and learning to problem diagnosis and

4. "Writing is Thinking", An AI knowledge system for Apples and IBM PC's, Kapstrom, Inc. 5952 Royal Lane, Suite 124 Dallas, Texas 75230.

suggestions for remediation. Only the first artificially intelligent learning systems are available today. Soon we will see a new wave of these innovative learning products as AI programs come to gradually touch every aspect of how our students learn reading and language arts.

The Importance of Sensing in Language Comprehension

Once we begin to consider how an "intelligent" machine might see, hear and think it becomes possible to build on certain elements of this metaphor for human learning. Of course some analogies between brains and computers are too superficial to be useful. Still one of the most useful aspects of computers is that to really understand the way information is processed we have to ask some fundamental questions about our written and spoken language. And connecting the recent developments in artificial intelligence to students' language learning breaks new intellectual ground.

Using the Dynamic Capabilities of Computer-Based Technology to Create a Highly Stimulating Environment

The primary cause of the failure of ESL students to acquire sound language skills in English is not the lack of innate ability. Rather we view it as a failure in institutional methodology and motivational techniques. Relying on extra drill and practice and rote skill training has not been successful for the bulk of ESL students. Likewise, simply using computerized learning tools to replicate boring practice lessons provides little payoff. Using interactive AI computer programs -- like the Reading Machine or OZ (*5*) -- to connect these same programs can amplify language communication found at school, in peer

5. OZ: Management Control, Fox & Geller, Inc., 604 Market Street, Elmwood Park, NJ 07407.

group situations and at home. In fact, some of these computer-based tools may help bring parents and teachers into a cooperative relationship that revolves around technology and a rich language heritage.

The new technology should not simply be used to extend the institutional mistakes of the past. What is viewed as irrelevant to ESL students in an earlier technological base (like the workbook) remains so in another. AI programs serve as one valid alternative to using computers as electronic worksheets or to simply teaching "computer literacy".

The earliest possible use of these new technological tools is crucial since we lose nearly half of our Hispanic students before they complete junior high school. To cut into what is the highest drop out rate of any minority group and help bridge the language and cultural differences between the home and school -- as well as learning problems raised by lack of motivation -- we now have available to us the most powerful learning tool ever invented -- artificial intelligence. It can serve as a collaborator and a motivator that allows us to do for many what was done for a few. And the benefits will go to all our students.

AI language programs can create a stimulating micro environment that focuses on the individual talents of the student. Higher order thinking skills and systematic problem solving strategies go hand in hand with the technology. Artificially intelligent machines, like the Reading Computer, create an exciting language arts environment. These electronic learning tools can serve as a multiethnic bridge to build respect across cultures. Children can use "intelligent"

work stations to listen, respond, record and continually interact with two languages -- and two sets of children's literature and social values. The bilingual support these AI language programs could give to most of our classrooms, which have unilingual English teachers, is not inconsequential.

The Future: Out of the Artificial Intelligence Lab and into the Multicultural Language Classroom

The educational failure of minorities is an old malignancy in America -- if its not "biological destiny", its "excellence". No matter how sincere the result is the same -- minority students fail. And majority students are deprived of the sense of social sensitivity that only close multicultural contact can bring.

The Reading Computer is simply the first example of how "artificially intelligent" computer "knowledge systems" can be used by children to associate with more than one language heritage. When this technology is used to amplify human multicultural contacts we have a tool that allows ESL students to develop self-concept and a sense of identity. And, at least as importantly, allows ENL students to understand that people who belong to cultural groups other than their own are real people with needs, feelings and emotions similar to their own.

New technological developments allow all our students to interact with the products of the imaginations of other

cultures in a highly motivating and respectful way. Having "foreign" language instruction (in Spanish for Hispanic students) and a multicultural component in the curriculum has few political opponents. And although education is a form of politics, there is no social or political reason why Hispanic students can't be allowed a more solid base in their rich cultural and language heritage. Students who have English as their first language can likewise be afforded the chance to gain a heightened sensitivity to other cultural themes, norms and social change. If knowledge-based AI computer systems make even a dint in these two interrelated areas of educational failure then they have served us well.

RESOURCES

We wish to acknowledge the extensive use of the following AI program sources in preparing this article:

OZ: Management Control
Fox & Geller, Inc.
604 Market Street
Elmwook Park, NJ 07407

Writing is Thinking
Kapstrom, Inc.
5952 Royal Lane
Dallas, Texas 75230

Thoughtware Series
Thoughtware
2699 South Bayshore Drive
Coconut Grove, Florida 33133

DSS Optionware
DSS Development
Corporate Place, 4 Barnard Lane
Bloomfield, Connecticut 06002

The Human Edge
Human Edge Software Corporation
2445 Faber Place
Palo Alto, California 94303

"Reading Computer", "Data Entry Machine"; Both are specific machines that contain visual and knowledge-based systems that are among the first educational devices to emerge from artificial intelligence research. Kurzweil Computer Products Inc., Cambridge, MA (A division of Xerox Corporation).